

Operating manual

for motors

ebmpapst

The engineer's choice



Dated 2017-10

Rev.0.4

Copyright

ebm-papst ZEITLAUF

GmbH & Co KG

Industriestraße 9

91207 Lauf a. d. Pegnitz

Germany

Disclaimer

Contents of the operating manual

This operating manual has been compiled with the greatest possible care. Nonetheless, ebm-papst does not provide any guarantee for the up-to-dateness, correctness, completeness or quality of the information provided. Liability claims against ebm-papst, which relate to material or non-material damage or losses, and which were caused by use or non-use of the information provided or by use of incorrect and incomplete information, are excluded, provided ebm-papst is not verifiably culpable of deliberate or grossly negligent act.

Copyright and trademark law

ebm-papst remains the sole holder of the copyright. Reproduction or use without the express consent of the author is not permitted.

Use

The safety regulations must be noted and followed when using the motors. Read through this operating manual carefully, before you start working on the drive system. Please note and follow the hazard signs and warnings to avoid personal risk and malfunctions.

This operating manual is to be treated as part of the drive system.

If the drive system is sold or passed on the operating manual must be handed over with it.

Copies can be made of safety regulations, assembly and installation instructions and passed on for the purpose of informing about potential hazards and their prevention.

ebm-papst is always interested in further developing and improving the products.

This may lead to possible deviations of the products to this operating manual.

Subject to change without notice.

The respective current version of this operating manual can be found in the download area of the Info Center on our website: www.ebmpapst.com

1	Introduction	6
1.1	Foreword	6
1.2	Target group	7
1.3	Notation used in this document	7
1.4	Terms Used	7
1.5	Warnings and notes	8
2	Safety Instructions	9
2.1	General safety instructions	9
2.2	Documentation	9
2.3	Standards, guidelines and directives	10
2.4	Personnel qualifications	10
2.5	Personal safety	10
2.6	Electrical /electromagnetic safety	11
2.7	Mechanical safety	11
2.8	Intended use	11
2.9	Maintenance / repair	13
2.10	Conversions and Modifications	13
2.11	Cleaning	13
2.12	Transport / storage	14
2.13	Disposal	14
2.14	Liability and warranty	15

3	Identification and Labelling	16
3.1	Scope of Delivery	16
3.2	Labelling	16
3.3	Purchase order numbers	17
3.3.1	PO number system: preferred types	17
3.3.2	PO number system: Standard program construction kits	18
3.3.3	PO number system: NEMA connection for spur gear and planetary gear	19
3.3.4	Customer-specific motor solutions	19
4	Installation and Operation	20
4.1	Assembly	20
4.2	Operation	21
5	Technical Specifications	23
6	Wiring Diagrams, Terminal Assignment	24
6.1	AC / DC / EC-Motors	24
6.2	Components	24
7	Malfunctions	25

1.1 Foreword

All the safety instructions listed under [Chapter 2](#) must be followed at all times during the installation and operation of the drive system; outside of Germany the relevant laws, directives, guidelines and regulations of the respective country also apply.

Read through this operating manual carefully before starting any work on the drive system.

Note and follow the following warnings in order to avoid personal risk or product malfunctions.

This operating manual is to be thought of and handled as part of the drive system and must be handed over with the drive system if it is sold or passed on.

The safety instructions can be copied and passed on to provide information about potential hazards and their prevention.

Depending on the version or revision status of the products, differences may exist compared to this operating manual. The user must check this before using the manual and take into account any such differences.

1.2 Target group

This operating manual is solely directed at qualified and trained skilled personnel with knowledge of electronics and mechanics.

1.3 Notation used in this document

In this operating manual the significance of texts is denoted by different presentation forms.

Descriptive text is presented without preceding symbol.

- Text with a preceding dot (•) indicates a list which is introduced by a heading.
 - Text with a preceding dash (–) is on a lower level below the list with a dot.

[Underlined blue text](#) denotes a cross-reference, which can be clicked in the PDF document.

The part of the document named in the text is then displayed.

1.4 Terms Used

Drive

The term drive includes the drive motor, the gearing and all components included in the scope of delivery.

Components

Components for gear motors include transmitters and brakes as well as electronic assemblies.

1.5 Warnings and notes

Warnings and notices are always positioned before the instruction, implementation of which can result in a hazard or property damage.

The following warnings are used in this document:



DANGER

Danger

This notice denotes a hazard with high risk, which will result in imminent fatality or serious physical injuries if it is not avoided.

- ▶ This arrow indicates the appropriate precaution to take to avert the hazard.



CAUTION

Caution

This notice denotes a hazard with low risk, which can result in minor or moderate physical injuries or property to damage if it is not avoided.

- ▶ This arrow indicates the appropriate precaution to take to avert the hazard.



NOTE

Note

This notice gives you use recommendations and helpful tips.

2.1 General safety instructions

- Before starting work, disconnect the drive system or the design application using suitable devices provided and secure it against being switched back on again.
- Before opening the units or entering the danger zone, safely bring all drives to a standstill and secure them against being switched back on again.
- Do not make any changes, add attachments or make modifications to the drive system without ebm-papst's approval.
- If the motor is subjected to unapproved loads, check it for damage and if necessary repair or replace it.
- Do not commission or start up the design application until it has been fully checked for compliance with all relevant legal requirements, directives and guidelines and the safety provisions relevant for its intended use (e.g. accident prevention regulations and technical standards).
- Re-assess any safety risks caused by the drive after it has been installed in the customer's application.

2.2 Documentation

In addition to this operating manual, the "Kickstart" PC software is required for making settings and parameterization (configuration) of the ECI-K4 motors and VDC-K4 motors. The operation is described in the "ebm-papst Kickstart" software handbook and can be downloaded from our homepage: www.ebmpapst.com

2.3 Standards, guidelines and directives

- The product does not fall under the Low Voltage Directive 2006/95/EC, as the nominal operating voltage is not within the voltage range from 75 V DC and 1500 V DC.
- The Machinery Directive MD is applicable, as the product is “partly completed machinery” in accordance with Article 2, paragraph g), MD 2006/42/EC. A “CE” marking does not have to be provided on the rating plate. A Declaration of Incorporation must have been drawn up in accordance with Annex II, Part 1, Section B, MD 2006/42/EC.
- The drives do not contain substances prohibited according to the RoHS Directive 2011/65/EU and under § 5 of the German Electrical and Electronic Equipment Law (“Elektro- und Elektronikgerätegesetz”).
- The Electromagnetic Compatibility Directive 2014/30/EU (EMC Directive).

2.4 Personnel qualifications

- Only qualified electricians may install the drive system and carry out the trial run and work on the electrical system.
- The drive system may only be transported, unpacked, operated and serviced by instructed and authorised skilled personnel.

2.5 Personal safety

- Provide adequate safeguards/contact protection.
- Wear suitable clothing.
- Do not wear loose clothing or jewellery.
- Keep hair, clothing and gloves away from rotating components.
- Wear personal protective equipment (hearing protection, thermal protection gloves).

2.6 Electrical / electromagnetic safety

- Check the electrical equipment of the drive system regularly.
- Only use cables and connectors approved by ebm-papst.
- Remove defective cables and loose connections immediately.
- Take suitable measures to avoid impermissible electromagnetic interference emissions.
- Take suitable measures against high-frequency EMC radiation.
- Ensure EMC capability in the terminal device/installation state.
- Use control devices to control the electromagnetic radiation.

2.7 Mechanical safety

- Only carry out work when the system / machine is at a standstill.
- Provide adequate cooling of the drive.
- Remove protective devices and guards on the drive system and design application only for the purpose of carrying out repair and assembly work.

2.8 Intended use

The drives with rotating movement are intended for industrial plants and systems, for installation in machines as defined in the Machinery Directive 2006/42/EC or for installation in equipment by competent companies or establishments, taking into account the applicable guidelines, directives and standards.

In accordance with the intended use of the machine / equipment in which the drive is installed, other product-specific and product-unrelated guidelines and standards are also applicable, the observance of which is the responsibility of the machine / equipment manufacturer.

Initial operation is prohibited until compliance of the end product with these guidelines and / or other guidelines and standards applicable for the end product is established. ebm-papst is responsible for establishing the compliance of the end products with the respective guidelines or standards. Observance of the proper operating data is imperative. In case of doubt, do not commence operation of the drive. In case of queries, please contact ebm-papst.

2.8.1 Type-related exclusion

Due to its type or design, the drive system must not be used in the following areas of use; this could result in hazards and equipment damage:

- In case of special fail-safe requirements.
- In aircraft and space vehicles.
- In rail and motor vehicles.
- In boats and ships.
- In potentially explosive atmospheres (EX protection area).
- For operation near flammable materials or components.
- For use as a safety component or for carrying out safety-relevant functions.

If the drive is used under operating conditions other than those described in [Chapter 5](#), prior consultation with the manufacturer is required.

Operation is prohibited in the case of improper use.

2.9 Maintenance / repair

- The control electronics / drives are maintenance-free for the period of the planned life.
- In observance of the operating conditions specified by ebm-papst, lubrication of the bearings and gearing components will last for the lifetime of the equipment.
- Repairs on the product may only be made by qualified personnel or ebm-papst.

2.10 Conversions and Modifications

Only operate the drive when it is in original and fault-free condition. Upgrades, modifications or conversions of the drives are prohibited. Always agree any desired modifications with ebm-papst.

Any conversions or modifications not expressly approved by us will invalidate any liability held by us. This also applies to damage caused by the use of non-original components or by operation outside of the agreed parameters.

2.11 Cleaning

Damage or malfunction if the unit is cleaned by

- cleaning with a water spray or high-pressure (jet) cleaner.
- Use of acids, alkalis and solvent-based cleaning agents.
- Use of pointed and sharp-edged objects.

2.12 Transport / storage

- Transport drives in their original packaging only.
- Secure the transport goods.
- Do not exceed the vibration values, temperature and climate ranges during the whole transport ([see Chapter 5](#)).
- Store drives, dry and protected in their original packaging, in a clean environment.
- Do not store the drive for longer than 24 months at -25 °C to +70 °C.
 - Please note that, in accordance with our General Terms and Conditions of Sale and Delivery, we assure a warranty of 12 months after delivery. We therefore recommend that the storage period be kept to a minimum.

2.13 Disposal

On disposing of the product, note and follow all legal and local regulations and requirements applicable in your country.

The drives and components are installed as components in machines and equipment. As individual components in the industrial field, they do not come under the purview of the law on electrical and electronic equipment. If the drives are installed in end products that come under the purview of this law, the manufacturer of the end product is responsible for observance of the legal regulations.

2.14 Liability and warranty

Complaints must be reported to ebm-papst immediately after finding the defect, error or fault.

ebm-papst GmbH & Co. KG does not accept any liability or provide any warranty whatsoever for incidents due to

- Failure to follow this operating manual.
- Incorrect handling and use of the drive system.
- Improper handling.
- Incorrect storage.
- Unsecured transport.
- Use of accessories and spare parts of other manufacturers without the express and written approval of ebm-papst.
- Changes to the drives without the express and written approval of ebm-papst.
- Opening/replacing the components in a service case by personnel not authorised by ebm-papst.

3.1 Scope of Delivery

The drives are assembled individually, in accordance with the construction kit system. Please refer to the scope of delivery for the relevant accompanying documents (e.g. delivery note).

- Check the content of the delivery immediately for conformity of the scope of delivery with the documents accompanying the goods. ebm-papst provides no guarantee in the event of fault notification at a later date.

In the case of

- identifiable damage from transportation
- Identifiable defects
- Incompleteness

submit a complaint immediately to ebm-papst.

3.2 Labelling

In addition to the external visibly identifiable features (e.g. drive shaft geometry, extension components), ebm-papst drives are labelled by the content of the rating plates on the gearing.

Labelling	
Spur Gearhead (Example)	Planetary Gearhead (Example)
FL 85.3 Gearing type.Number of stages	NP 63.2 Gearing type.Number of stages
i = 54:1 Gear reduction	i = 26:1 Gear reduction
36P Auditor number	36P Auditor number
40/16 Week /year of production	40/16 Week /year of production

The exact product design is clearly described by the order number. This is specified in the order papers.

3.3 Purchase Order Numbers

3.3.1 PO number system: preferred types

With our preferred types, we offer you a selection of motors and gear motors which are provided ready for dispatch within 48 hours. The preferred types can be purchased with a maximum order volume of 20 products per order.

"Preferred type" indicator	Motor / Gear motor	Motor type indicator	Motor size	Package length	Voltage	Electronic variants	Gears	Gear sizes	Number of stages	Reduction	Generator	Brake
V	M G	ECI BCI VDC	42 49 52 63 80	10 20 30 40 50 60	A = 12 V B = 24 V D = 48 V E = 60 V	K1 K4	0 = Optimax P = Performax® PP = Performax®Plus NP = NoiselessPlus E = EtaCrown® EP = EtaCrown®Plus	42 52 63 75	1 2 3	5 9 20 30	G1 G2 G3 G4 G5	B1 B2 B3

Example:

VG.ECI4240BK1.PP42.1.5 (ECI-42.40, 24 V K1 with Performax®Plus 42 (single-stage) reduction 5:1)

VM.ECI8060DK1.G1B1 (ECI-80.60, 48 V K1 with generator 1 and brake 1)

3 Identification and Labelling.

3.3.2 PO number system: Standard program construction kits

Generate the product tailored to you online using the standard program construction kits. We offer you a unique product configurator on our Internet portal, using which you can put together all our solutions according to your specific needs.

Gear size	Number of stages	Types of EC motor	Motor size	Package length	Number of poles in capacitor motor	Gears	Consecutive numbering
32	1	C = VDC Motor D = DPM Motor E = ECI/ECM Motor	24	10	2	C = Compactline E = EtaCrown® EP = EtaCrown®Plus F = Flatline H = Performax® HRL L = NoiselessPlus O = Optimax P = Performax® PP = Performax®Plus	xx
42			28	14			
50			30	15			
52			35	20			
63			40	25			
75			42	30			
78			43	38			
85			48	40			
90			49	45			
91			52	50			
92	5		54	55	4		
			63	60			
			71	77			
			80	80			

Example:
42.2.E4240.P04 (Performax® 42, 2-stage, ECI-42.40, reduction 30:1)
92.3.4030.4.C12 (Compactline 92, 3-stage, KM4030, 4 pole, reduction 142:1)

3 Identification and Labelling.

3.3.3 PO number system: NEMA connection for spur wheel and planetary gears

Gears with NEMA connection give you the possibility to add these to any motors with NEMA geometry

Size	Number of stages	NEMA	Size	Gears	Consecutive numbering
42	1	N	17	C = Compactline F = Flatline P = Performax®	xx
52					
63					
78					
85					
90					
91					
92					

Example:
42.1.N17.P01 (Performax® 42, 1-stage, NEMA 17 connection, reduction 5:1)
85.3.N23.F03 (Flatline 85, 3-stage, NEMA 23 connection, reduction 40, 3:1)

3.3.4 Customer-specific motor solutions

The above safety information also applies to customer-specific motors.

Example:
 426.92231 (Compactline 92.2 VDC-3-54.14)
 493.92021 (Performax® 52.1 BCI-63.55)

4.1 Assembly

Before assembly, carry out an identity check on the drive.



Risk of fatal injury from electric shock.

Installation and maintenance work carried out under live voltage cause severe to fatal injuries.

- ▶ Before working on the product, switch off the power supply and protect it from being reconnected unintentionally.



Risk of fatal injury from electric shock.

Incorrectly connected drives cause serious physical injuries or even death.

- ▶ Ensure correct connection of the electrical connections including the protective conductor connection (if specified).



Risk of injuries from rotating components

Rotating components can cause cutting injuries.

- ▶ Do not stay in the danger zone of the product.
- ▶ Do not wear any loose or hanging clothing or jewellery while working on moving parts.
- ▶ Protect long hair with a hair net.
- ▶ Only carry out work when the system / machine is at a standstill.



NOTE

The drives can be assembled in any installation location desired.

4.2 Operation

Unless otherwise specified in the product data sheet, the drives are suitable for an ambient temperature range of -20 °C to +80 °C. They are suitable for S1 operation, i.e. continual operation. In short time operation, higher loads than those specified in the product data sheet are permissible. In this case, please contact ebm-papst for further information.

Where components are combined with different safety provisions, the safety provision for the entire system is based on the lowest safety provision of the individual components.

The safety provision is determined according to EN 60529.

first code number	protection against contact and foreign substances
0	no protection
1	protection against large foreign bodies $\emptyset > 50$ mm
2	protection against medium sized bodies $\emptyset > 12$ mm
3	protection against small bodies $\emptyset > 2,5$ mm
4	protection against grain-formed bodies $\emptyset > 1$ mm
5	protection against noxious dust deposits
6	protection against dust

4 Installation and Operation.

second code number	protection against water
0	no protection
1	protection against vertical water drops (drip proof)
2	protection against diagonal water drops (90° ± 15)
3	protection against spray water (30° – 150°)
4	protection against water jets from all directions (splash proof)
5	protection against stream water from all directions (hose proof)
6	protection against flooding
7	protection against dipping
8	protection against immersing

5 Technical Specifications.

The technical specifications and usage parameters agreed by the contract of sale apply as standard for the product you have purchased.

The information on the technical specifications and the electrical connection of the drive (circuit diagram) can also be found in the current catalogues of the individual motor series and on the internet under www.ebmpapst.com or www.zeitlauf.com.

Should you be unable to access either of these sources, please contact ebm-papst. We will immediately provide you with the relevant technical specifications.

6 Wiring Diagrams, Terminal Assignment.

6.1 AC/DC/EC-Motors



NOTE

Pin assignment and circuit diagrams can be found on the internet under www.ebmpapst.com or in the current catalogues of the individual motor series.

Ensure that the polarity of the connections is correct, in accordance with the desired rotation direction.

6.2 Components

- Added components
 - Spring action brake
 - Magnetic pulse transducer
 - Optoelectronic angle step counter

For connection information visit www.ebmpapst.com or refer to the current catalogues of the individual motor series.

- Additional components
 - Operating electronics
 - Speed controller / rotation speed regulators
 - Switching power supplies

For connector see product-specific operating instructions of respective components.

7 Malfunctions.

Should malfunctions occur, e.g. such as unusual running noises or temperature developments, please contact ebm-papst. You will need to provide the following specifications:

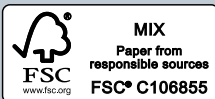
- Rating plate specifications
- Type and extent of the malfunction
- Circumstances of the malfunction
- Application data (torque cycle, rotation speed, loads, local conditions, etc.)

Do not operate the drive/application until final clarification is available.

Note.

Note.

www.ebmpapst.com



**ebm-papst St. Georgen
GmbH & Co. KG**

Hermann-Papst-Straße 1
78112 St. Georgen
Germany
Phone +49 7724 81-0
Fax +49 7724 81-1309
info2@de.ebmpapst.com

**ebm-papst ZEITLAUF
GmbH & Co. KG**

Industriestraße 9
91207 Lauf a. d. Pegnitz
Germany
Phone +49 9123 945-0
Fax +49 9123 945-145
info4@de.ebmpapst.com

ebmpapst

The engineer's choice